

WHAT IS CLAIMED IS:

1. An apparatus for separating syngas into fuel cell quality hydrogen and sequestration ready carbon dioxide, comprising

first and second fluidized bed reactors containing solids containing calcium compounds present as CaO , Ca(OH)_2 and CaCO_3 and mixtures thereof and iron compounds present as FeO , Fe_3O_4 and Fe_2O_3 and mixtures thereof;

first and second solids transfer lines for circulating said solids mixtures between said first and second fluidized bed reactors;

a first inlet feed for charging said first fluidized bed reactor with high temperature steam and syngas;

a second inlet feed for charging said second fluidized bed reactor with high temperature steam and oxygen;

means for removing substantially pure hydrogen from said first fluidized bed reactor; and

means for removing CO_2 and SO_2 from said second fluidized bed reactor.

2. An apparatus according to claim 11 further comprising steam purge lines in fluid communication with said first and second solids transfer lines.

3. An apparatus according to claim 11 wherein said first fluidized bed reactor is a bubbling reactor or entrained flow reactor

4. An apparatus according to claim 11 wherein said second fluidized bed reactor is a counterflow reactor.

5. An apparatus according to claim 11 wherein a means such as a cyclone or other device for separating solids from fluids is provided at the outlet of said first fluidized bed reactor.